

Remarks

Claims 1-10, 18-25, 28, 29, and 35 were pending in the subject application. Claims 5, 22, and 23 remain pending but withdrawn from consideration. Submitted herewith is a Request for Continued Examination (RCE) under 37 CFR §1.114 for the subject application. By this Amendment, claims 1, 7, 18, 19, 25, 28, and 29 have been amended and claims 6 and 24 have been cancelled. Support for the claim amendments can be found throughout the subject specification and in the claims as originally filed. Entry and consideration of the amendments presented herein is respectfully requested. Accordingly, claims 1-4, 7-10, 18-21, 25, 28, 29, and 35 are currently before the Examiner for consideration. Favorable consideration of the pending claims is respectfully requested.

Claims 1-4, 8-10, 18-21, 28, 29, and 35 remain rejected under 35 USC §112, first and second paragraphs, as lacking sufficient written description, as non-enabled by the subject specification, and as indefinite. The Examiner maintains, for example, that there is no support in the specification for the claim language “non-branching sol-gel active portion of a dendrimer substrate”, that there is no teaching of how to form a sol-gel active site on a non-branching portion of a dendrimer substrate, and that it is not clear what is meant by the claim language. Applicants respectfully assert that there is support for the claim language, that it is not indefinite, and that the claims are enabled. However, by this Amendment, Applicants have cancelled the language “non-branching sol-gel active portion” from the claims. Thus, Applicants respectfully assert that the rejections are moot. Applicants further assert that reference to the “core” of a dendrimer is supported in the subject specification and is well understood by a person of ordinary skill in the art. Accordingly, reconsideration and withdrawal of the rejections under 35 USC §112, first and second paragraphs, is respectfully requested.

Claims 1-4, 8-10, 18-21, 28, 29, and 35 remain rejected under 35 USC §103(a) as obvious over Malik *et al.* (WO 00/11463) in view of either Kim *et al.* (U.S. Patent Publication No. 2002/0020669) or Neumann *et al.* (DE 19 621 741) and the Patent Office’s translation of Neumann *et al.* (19 621 741) and the Patent Office’s translation of Neumann *et al.* (DE 19 621 741), and further in view of Newkome *et al.* (U.S. Patent No. 5,703,271). Applicants respectfully traverse these grounds of rejection.

Applicants respectfully maintain that the claimed invention is not obvious over the cited references, regardless of whether the references are taken alone or in combination. The present invention is not obvious over the cited references since conventional dendrimers lack a sol-gel-active portion. If a person were to use a conventional dendrimer (*i.e.*, one without a sol-gel-active portion in its structure) in the sol-gel system taught by Malik and Wang (WO 00/11463), the dendrimer will not chemically bond to the sol-gel matrix. A capillary column coated with such a sol-gel matrix will not be effective as a stationary phase or as an extraction medium since the dendrimer molecules will be washed off the capillary column during any rinsing with solvents.

As noted above, conventional dendrimers do not possess a sol-gel active portion and none of the cited references teach how to prepare dendrimers with a sol-gel active portion. Applicants note that the Neumann *et al.* patent first derivatizes the silanol groups on a silica surface with sol-gel-inactive groups (*e.g.*, amine) leaving essentially no accessible silanol groups to participate in the sol-gel reactions for covalent attachment of the sol-gel dendrimer coating to the silica surface. Therefore, if the teachings of the Malik and Wang publication are applied to the derivatized surface of the Neumann *et al.* patent, the created sol-gel coating will not be chemically bonded to the fused silica surface (few accessible silanol groups after derivatization) resulting in an unstable coating which will be easily washed off the substrate during treatment or operation. Clearly, a person of ordinary skill in the art, utilizing the teachings of Malik and Wang and the Neumann *et al.* patent, would not arrive at the sol-gel dendrimer capillary of the present invention where the sol-gel dendrimer matrix is covalently bonded to the sol-gel substrate on the fused silica capillary surface.

The combination of the Malik and Wang publication with the Kim *et al.* publication also fails to teach or suggest Applicants' claimed invention. The Kim *et al.* publication teaches, as described at paragraph 0010 therein, derivatizing the dendrimer's "exterior functional sites." These exterior sites are on the branches of the dendrimer. A person of ordinary skill in the art would understand that the derivatizing at an "exterior functional site" is on the branches of the dendrimer. If the conventional dendrimers of Kim *et al.* (with derivatized exterior functional sites) are used to prepare a sol-gel dendrimer capillary column in combination with the teachings of Malik and Wang, it will lead to one of the following two outcomes depending on whether the derivatized arm of the dendrimer is sol-gel-active or not:

(1) If the derivatized arm of the dendrimer is not sol-gel active, it will lead to a capillary column where the dendrimer is not chemically bonded to the sol-gel substrate of the created stationary phase coating, and therefore, this dendrimer will be easily washed off or lost during capillary preparation, conditioning, or operation.

(2) If the derivatized arm of the dendrimer is sol-gel active, it will lead to a stationary phase where the dendrimer is attached to the sol-gel substrate by the branching structure (not by a non-branching portion) since the derivatization is carried out on the exterior functional sites (*i.e.*, on the branches). Such architecture of the sol-gel dendrimer stationary phase is undesirable since it will drastically reduce the number of terminal functional groups on the dendrimer available for interaction with the analyte molecules. This is in direct contrast with the present invention, in which the dendrimer can be covalently attached to the sol-gel substrate by the sol-gel active portion, thereby exposing all the terminal functional groups on the dendrimer for effective interaction with the analyte molecules. Thus, a person of ordinary skill in the art would not be motivated to combine the teachings of Malik and Wang with those of Kim *et al.* and, moreover, would not even arrive at Applicants' claimed invention even if the teachings of Malik and Wang and the Kim *et al.* publication were combined.

Applicants respectfully assert that the Newkome *et al.* patent does not cure the deficiencies of the Malik and Wang publication, the Neumann *et al.* patent or the Kim *et al.* publication. The Newkome *et al.* patent does not teach or suggest how to chemically bind an isocyanate monomer-based dendrimer to a sol-gel substrate by the non-branching sol-gel active portion of a dendrimer. Thus, the Newkome *et al.* patent suffers from the same failings as the Neumann *et al.* patent and the Kim *et al.* publication.

Applicants note that claims 6 and 24 were not included under these rejections. By this Amendment, independent claims 1 and 19 have been amended to incorporate the elements of claims 6 and 24, respectively. Accordingly, Applicants respectfully assert that the rejections of claims 1 and 19 are rendered moot by the amendments presented herein.

As the Examiner is aware, it is well established in patent law that in order to support a *prima facie* case of obviousness, a person of ordinary skill in the art must generally find both the suggestion of the claimed invention, and a reasonable expectation of success in making that invention, solely in

light of the teachings of the prior art and from the general knowledge in the art. *In re Dow Chemical Co.*, 5 USPQ2d 1529, 1531 (Fed. Cir. 1988). One finds neither the suggestion, nor the reasonable expectation of success, of Applicants' claimed invention in the cited references. Accordingly, reconsideration and withdrawal of the rejections under 35 USC §103(a) is respectfully requested.

It should be understood that the amendments presented herein have been made solely to expedite prosecution of the subject application to completion and should not be construed as an indication of Applicants' agreement with or acquiescence in the Examiner's position.

In view of the foregoing remarks and amendments to the claims, Applicants believe that the currently pending claims are in condition for allowance, and such action is respectfully requested.

The Commissioner is hereby authorized to charge any fees under 37 CFR §§1.16 or 1.17 as required by this paper to Deposit Account 19-0065.

Applicants invite the Examiner to call the undersigned if clarification is needed on any of this response, or if the Examiner believes a telephonic interview would expedite the prosecution of the subject application to completion.

Respectfully submitted,



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Attachment: Request for Continued Examination